



Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Vicki Golding. This piece was commissioned by Alluvium and has told our story of water across Country, from catchment to coast, with people from all cultures learning, understanding, sharing stories, walking to and talking at the meeting places as one nation.

This report has been prepared by Alluvium Consulting Australia Pty Ltd for Douglas Shire Council under the contract titled 'WO5429 Foreshore Management Plan'.

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Version: 2 – draft
Date issued: May 2021
Issued to: Melissa Mitchell

Citation: Alluvium, 2021, Draft Foreshore Management Plan: Newell Beach, report prepared by

Alluvium Consulting Australia and Wild Environmental for the Douglas Shire Council.

Cover image: Mangrove coastline, Shutterstock





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## 1 Introduction

The coastline is an important place for many Australians, providing significant social and cultural value. This is especially so for many residents of the Douglas Shire who have identified these unique coastal landscapes and natural ecosystems among some of the most important factors attracting people to this coastline (DSC 2019a). The Douglas Shire coastline also has high tourism value, attracting many visitors to the area.

The Eastern Kuku-Yalanji and Yirriganydi peoples are the Traditional Custodians of the Land and Sea Country within the Douglas Shire. They have lived in and cared for this region for thousands of years, represented in important cultural sites throughout the Shire, and the memories and experiences of its people; past, present and future.

Douglas Shire Council (DSC) has an extensive 111 km long coastline that extends from Degarra in the north to south of Wangetti. The Shire is well known for its diverse coastline and its proximity to the Great Barrier Reef. Much of the Shire is within the Wet Tropics World Heritage Area and its dynamic coast consists of a variety of sandy beaches, rocky headlands and coastal rainforests.

The region's beaches and foreshore areas are important both to people and to the ecosystems around them. Coastal landscapes provide essential habitat for life on the foreshore and provide visual and recreational amenity to the people. Healthy coastal ecosystems are necessary to promote the resilience of plant and animal communities to coastal hazard impacts. Denser vegetation types are also effective in reducing the destructive forces of a storm tide for communities and infrastructure landward of the foreshore.

However, these ecosystems are experiencing ongoing disturbance as a result of erosion, vehicle and pedestrian access, weeds and pest species, illegal dumping, and runoff from stormwater and agricultural land. These factors threatening dune stability and reducing the erosion buffer often result in vegetation loss, impacts to native fauna species, and changes in ecosystem structure.

To help manage and protect these important coastal zones, DSC has developed five Foreshore Management Plans (FMPs) for the Wonga, Newell, Cooya, Four Mile and Oak Beaches.

## 1.1 Purpose

In 2019, DSC developed the Resilient Coast Strategic Plan 2019-2029 (referred to henceforth as the Strategy) and have committed to undertake actions to reduce the impacts of coastal hazards, such as erosion and coastal flooding, and activities in the coastal zone. A priority outcome of the Strategy is to undertake dune protection, maintenance and monitoring. This encompasses the foreshore area and is the focus of the FMP.

The FMPs will help to guide Council in the protection, maintenance and management of the coastline and foreshore, while maintaining the natural character of the area and respecting ecological, cultural and social values of these coastal reserves.

The plans will:

- Ensure there is a **shared understanding** of the social, cultural, environmental and economic values and uses of the foreshore zone
- Identify options for the **proactive management** of vulnerable areas of the foreshore zone over the next 5 years
- Help **improve** and maintain the vegetation cover and condition in the foreshore zone.

## 1.2 Foreshore Management Plan area

Newell Beach is a coastal community located along a 2.4 km stretch of foreshore between the Saltwater Creek and Mossman River estuaries (Figure 1). It is the head of a barrier spit system. A narrow dune system, approximately 20 to 80 m wide, makes up the foreshore area and has primarily been formed by wave action. The upper and lower beach is steep and the intertidal zone is approximately 10 to 20 m wide.

The community at Newell Beach is comprised of approximately 200 dwellings, as well as a number of services and tourist facilities. At the 2016 census, there were 336 residents at Newell (ABS 2017). A number of residents are absentee owners who use the foreshore area only seasonally. There are houses located in the foreshore area relatively close to the foreshore and during the site inspections, it was noted that encroachment and clearing on Council land is occurring.

Due to its position between the two estuaries, Newell Beach is a very active system, experiencing changes to the shoreline position, with erosion and accretion documented as early as 1968 (DSC 2000). A rock revetment was constructed along the northern bank of the Mossman River in 1975 to mitigate erosion that was threatening houses (DSC 2000). More recently, beach renourishment and geotextile sandbag groynes have been emplaced at the southern end of Newell Beach during 2016 and the



**Figure 1.** Newell Beach foreshore management area.

beach condition during the site inspection suggests that the groynes have been effective in retaining sand within that coastal segment.

## 1.3 Implementation

These FMPs were developed in consultation with each beach community as well as residents and ratepayers in the whole Shire to inform the management actions and planning decisions for the area. These actions have been tailored to incorporate what the community values about their foreshore and how the foreshore is used.

The plan outlines actions for dune protection, including weed species for removal, native vegetation species for regeneration, and pedestrian and vehicle access management. It also provides a schedule for implementation to allow Council to prioritise actions for the area. This FMP remains non-statutory but provides an informed and proactive guide for the future management of Newell Beach.

# 2 Study area and planning context

Newell Beach is a coastal community located along a stretch of foreshore between Saltwater Creek and Mossman River. There is a variety of land zoning uses and ecological communities at Newell Beach. The following section will outline and illustrate the DSC land zoning and vegetation and faunal communities that have been identified by a literature review and during site visits and surveys.

## 2.1 Legislative, policy and strategy setting

Coastal management is guided by Commonwealth, State and local legislation. The legislation results in a complex structure of rights and responsibilities. Key legislation, plans, policies and strategies relevant to foreshore management are summarised in Table 1.

Table 1. Summary of legislation, policy, plans and strategies relevant to foreshore management

Legislation	Relevance
Biosecurity Act 2014	<ul> <li>This Act provides a comprehensive biosecurity framework to manage the impacts of animal and plant diseases and pests.</li> <li>The purpose of this Act is to:         <ul> <li>Provide a framework for an effective biosecurity system for Queensland.</li> <li>Ensure the safety and quality of animal feed, fertilisers and other agricultural inputs.</li> <li>Help align responses to biosecurity risks in the State with national and international obligations and requirements.</li> </ul> </li> <li>The purpose of the Act is also to manage risks associated with emerging, endemic and exotic pests and diseases.</li> </ul>
Coastal Protection and Management Act 1995	<ul> <li>This Act aims to provide for the protection, conservation, rehabilitation and management of the coastal zone, including its resources and biological diversity.</li> <li>This Act considers the goal, core objectives and guiding principles of the National Strategy for Ecologically Sustainable Development in the use of the coastal zone.</li> <li>This Act ensures that decisions about land use and development safeguard life and property from the threat of coastal hazards.</li> <li>This Act encourages the enhancement of knowledge of coastal resources and the effect of human activities on the coastal zone.</li> </ul>
Planning Act 2016	<ul> <li>This Act provides for an efficient, effective, transparent, integrated, coordinated and accountable systems of land use planning and development assessment to facilitate the achievement of ecological sustainability by:         <ul> <li>Coordinating and integrating planning at the local (i.e., planning schemes), regional and State scales</li> <li>Managing the process and effects of development on the environment (including managing the use of premises).</li> </ul> </li> </ul>
Vegetation Management Act 1999	<ul> <li>This Act aims to regulate the clearing of vegetation by:         <ul> <li>Managing the environmental effects of clearing.</li> <li>Regulating clearing in a way that conserves remnant vegetation that is an endangered regional ecosystem, an of concern ecosystem, or a least concern regional ecosystem.</li> <li>Ensuring clearing does not cause land degradation and allows for sustainable land use.</li> </ul> </li> </ul>

Legislation	Relevance
	<ul> <li>Preventing the loss of biodiversity, maintain ecological processes, and reduce greenhouse gas emissions.</li> </ul>
Environmental Protection Act 1994	<ul> <li>This Act aims to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, and that maintains the ecological processes on which life depends.</li> <li>The Act defines environmental value, environmental harm and best practice environmental management.</li> </ul>
Nature Conservation Act 1992	<ul> <li>This Act aims to conserve nature while allowing for the involvement of indigenous people in the management of protected areas.</li> <li>This is to be achieved by a conservation strategy for QLD that declares and manages protected areas, protects native wildlife and habitats, ensures use of protected wildlife and areas to be ecologically sustainable, and allows cooperative involvement of Aboriginal and Torres Strait Islander people.</li> </ul>
Environment Protection and Biodiversity Conservation Act 1999	<ul> <li>This Act aims to provide protection of the environment, promote ecologically sustainable development and the conservation of biodiversity.</li> <li>The Act aims to promote the use of indigenous knowledge of biodiversity through a cooperative approach to the protection and management of environments.</li> </ul>
Queensland Local Government Act 2009	<ul> <li>This Act provides a system of local government in Queensland, including:         <ul> <li>The way in which a local government is constituted and the nature and extent of its responsibilities and powers</li> <li>A system of local government in Queensland that is accountable, effective, efficient and sustainable.</li> </ul> </li> </ul>
Local Laws	<ul> <li>Local laws sit within the Local Government Act 2009 and under the Act a local government may make and enforce any local law that is necessary or convenient for the good rule and local government of its local government area.</li> <li>This legislation sets out the laws for the Douglas Shire Council area, including animal management, community and environmental management, local government areas, and facilities.</li> </ul>

# 2.2 Zoning

## Land use

The DSC Planning Scheme has been used to understand the boundaries between different land uses (Figure 2) (DSC 2018). At Newell Beach, the primary land uses within or immediately adjacent to the foreshore area are conservation, low density residential, recreation and open space, and rural. These land uses have implications for the management of the foreshore area. Changes within these zones can have flow-on impacts to the foreshore area, including:

- habitat fragmentation
- runoff
- illegal clearing and planting, including weed dispersal and growth
- impacts on fauna (light and noise pollution, road kills)

#### Conservation zone

The conservation zone provides for the protection, restoration and management of areas identified to support significant biological diversity and ecological integrity (DSC 2018). Relevant outcomes identified in the Douglas Planning Scheme for the conservation zone include (DSC 2018):

- Protection of biological diversity, ecological integrity and scenic amenity.
- Recreational or other uses of areas are consistent with the management plans of the controlling authority so that conservation and scenic values of these areas are not adversely affected.
- Any use of land in private ownership does not affect the environmental, habitat, conservation or scenic values of that land or surrounding area.
- Any low intensity facilities based on the appreciation of the natural environment or nature based recreation only establish where there is a demonstrated need and provided they have a minimal impact on the environmental and scenic amenity values of the site or surrounding area.
- The provisions of the Return to Country Local Plan facilitate economic and social opportunities on traditional Indigenous lands.
- Further lot reconfigurations other than amalgamations, boundary realignments to resolve encroachments, or for the practical needs of essential community infrastructure, or to facilitate Return to Country outcomes do not occur.

#### Recreation and open space zone

The purpose of the recreation and open space zone is to provide for informal recreation where the built form is not essential to the enjoyment of the space, parks that serve the recreational needs of residents and visitors, and a range of organised activities that require a level of built infrastructure (DSC 2018). Relevant outcomes to the recreation and open space zone include (DSC 2018):

- Areas are provided for active sport and recreation to meet community needs.
- Open space is accessible to the general public for a range of outdoor sport and recreation activities.
- A range of functional and accessible open spaces, including local and regional parks and linkages, are available for the use and enjoyment of residents and visitors.
- Ancillary structures and buildings such as shelters, amenity facilities, picnic tables and playgrounds are provided where necessary.
- Sport and recreation areas are planned and designed to enhance community liveability, scenic amenity and provide a retreat from developed areas.
- The use of sport and recreation areas does not unduly affect the amenity of adjacent areas particularly residential areas.

#### Residential zone

Within Newell Beach, there are low density and rural residential areas adjacent to the foreshore area. Low density residential areas provide for predominantly dwelling houses supported by community uses and small-scale services and facilities that cater for local residents (DSC 2018). The purpose of the low density residential zone will be achieved through the following relevant outcomes (DSC 2018):

- Development maintains a high level of residential amenity having regard to traffic, noise, dust, odour, lighting and other locally specific impacts.
- Development reflects and enhances the existing low density scale and character of the area.
- Development is reflective and responsive to the environmental constraints of the land.
- Development is supported by necessary community facilities, open space and recreational areas and appropriate infrastructure to support the needs of the local community.

## Rural zone

There is rural land adjacent to the foreshore area at Newell Beach with the purpose to provide for cropping, intensive horticulture, intensive animal industries, animal husbandry, animal keeping and other primary production activities. This land use can also provide for the protection or management of significant natural resources and processes to maintain the capacity for primary production. Outcomes relevant to the foreshore area include (DSC 2018):

- Areas for use for primary production are conserved and fragmentation is avoided.
- Development embraces sustainable land management practices and contributes to the amenity and landscape of the area.
- Adverse impacts of land use, both on-site and on adjoining areas, are avoided and any unavoidable impacts are minimised through location, design, operation and management.
- Areas of remnant and riparian vegetation are retained and rehabilitated.



**Figure 2.** Douglas Shire Council Planning Scheme land use zoning within the Newell Beach foreshore area (DSC 2018).

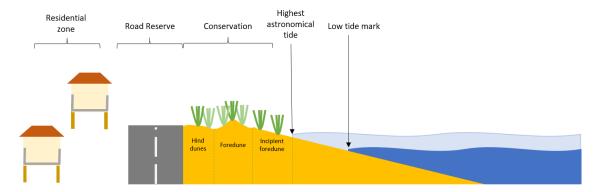
#### 2.3 Coastal hazards

The entire length of Newell Beach is vulnerable to coastal erosion (DSC 2019b). This erosion may be temporary or permanent. Temporary erosion is generally caused by storms, winds or waves, and the beach rebuilds during calmer periods. Permanent erosion is more likely to occur over the longer-term due to rising sea levels or significant changes to sediment transport dynamics where sand becomes lost to the coastal system. Erosion may impact the foreshore area, including the vegetation, wildlife habitats, infrastructure, recreational uses or values.

Large geotextile sandbag groynes have been placed at the southern end of Newell Beach and sand renourishment has also taken place. This was undertaken in 2016 to address erosion and a recent site inspection suggests that the groynes have been effective in retaining sand along that segment of the coast.

#### Foreshore management precinct

The foreshore zone at Newell Beach extends from the highest astronomical tide (HAT) line to the road reserve limit of the Conservation zone at the northern end of Marine Parade and to the seaward limit of the low-density residential zone for the remaining length of the Newell Beach foreshore (Figure 3).



**Figure 3.** Graphic representation of the Newell Beach foreshore management precinct.

The foreshore area includes the dune system behind the beach, immediately landward of the HAT mark and is made up of the following three key sections (Figure 3):

- Incipient foredune: a windblown platform that forms in front of the foredune, however is not present on all beaches. This is where vegetation such as grasses and creepers first establish and provides a protective buffer to erosion, and storm effects, including winds and waves.
- **Foredune:** the main sandy formation and is of greater height than the incipient dune. Larger vegetation species establish here, including shrubs, which provide greater wind protection.
- **Hind dune:** a smaller dune system behind the foredune. These systems tend to be well established, including larger vegetation species such as trees.



Newell Beach foreshore

## 3 Foreshore values

The Newell Beach foreshore is valued by residents and visitors for a number of reasons. These values play a role in the management of the foreshore area. The following section outlines the social, cultural and environmental values that have been identified for the Newell Beach foreshore area, as well as describing any threats or challenges to these values.

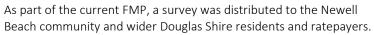
## 3.1 Knowledge sharing and community engagement

There have been several opportunities in recent years for knowledge sharing regarding coastal hazards and the foreshore environment, primarily through the Strategy and Foreshore Community Consultation.

Community consultation was undertaken at Newell Beach regarding improvements to the foreshore amenities (DSC 2020). A survey was circulated to residents throughout the shire to gather feedback, with a focus of residents at Newell Beach. The Council received 97 responses with the majority of respondents living at Newell Beach. While the focus of the survey was around infrastructure and amenities, some points of consideration for the foreshore management plan were raised. These include:

- disability access
- leaving much of the esplanade as open space
- better and more regular maintenance of vegetation (including clearing of undergrowth and palm fronds)
- constructing a footpath above high tide mark and to connect facilities
- revegetation to prevent beach erosion and provide a wind block for beachfront houses.

Some of the feedback also included preventing illegal clearing and the creation of new, informal access paths through the vegetation. The survey also highlighted illegal green waste dumping that is occurring along the foreshore and covering the dunes. Overwhelmingly, there is a desire within the Newell Beach community to keep formalised structures to a minimum to maintain the natural amenity.





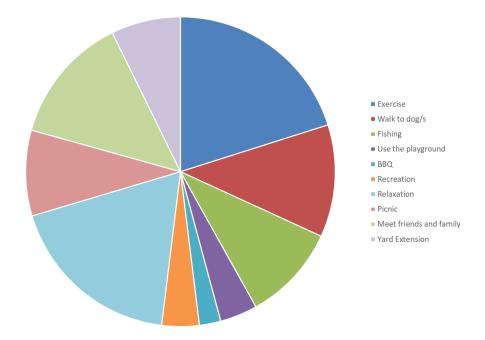
Vegetation clearing for an access track

The aim of the survey was to understand how they use and what they value about the foreshore zone, and how they would like to see it managed. The survey was advertised through the Council Foreshore Management Plans site, Facebook, community noticeboards, emails to residents and community groups, and physical copies at Council offices. The survey ran from 31<sup>st</sup> March to 23<sup>rd</sup> April 2021 and a total of 317 responses from residents and community groups were received from throughout the Douglas Shire. Newell Beach residents accounted for 43 responses, most respondents being permanent residents (homeowners).

## Social values

Three quarters of the respondents live adjacent to or within 1 km of the Newell Beach foreshore. Seventeen percent of the remaining respondents live more than 5 km from the foreshore. This information indicates that the foreshore area is significant to residents and ratepayers at Newell Beach. Most of the respondents visit Newell Beach at least once a week and small proportion visit on a monthly basis.

People predominantly use the Newell Beach foreshore for exercise and relaxation (Figure 4). The next most common uses for the foreshore area are meeting friends or family, walking the dog, fishing and picnicking. In some cases, the residents use the foreshore as an extension of their yard.



**Figure 4.** The most common uses of the foreshore area at Newell Beach.

## Sense of place

Newell Beach residents most value the natural beauty of the beach and the wildlife. The foreshore and beach are also highly valued for recreation, including exercising, fishing and walking dogs. The most meaningful aspect of the foreshore to Newell Beach residents is maintaining the natural and untouched beauty, habitat and vegetation such as the littoral rainforest, ease of access and views of the ocean and nearby islands.



The residents identified a number of environmentally significant areas along the Newell Beach foreshore. An example of an environmentally significant habitat is the littoral rainforests along the foreshore. These are sensitive environments that provide important habitats for animals but may be impacted by vegetation clearing, beach access and weeds. There may also be turtle nesting sites at the northern end of Newell Beach, however, this requires further investigation and monitoring. A number of

plant species have been identified as

significant, including beauty leaf (*Calophyllum inophyllum*) and the coconut palms.

#### Concerns and threats

Respondents had a number of concerns about the Newell Beach foreshore. They noted issues of vegetation clearing by residents to create access tracks and windows for ocean views, as well as an abundance of weeds taking over native dune



"One of the most important issues in Newell Beach is the vegetation degradation on the foreshore. This is imperative and tree planting should be implemented as soon as possible." – Newell Beach resident.

species. Collectively, these issues increase the susceptibility of the beach to erosion, which has already been observed to occur at Newell Beach. Respondents also noted concerns of sea level rise. Respondents would like to see better management of this foreshore buffer, perhaps with the involvement of community groups and volunteers to manage weeds and revegetate with native species.

Another common concern was the issue of rubbish on the beach. Some noted that foreshore bins were often overflowing, especially during tourist season, and that more rubbish bins are needed. There was also a suggestion to include recycling and fishing tackle bins along the foreshore.

#### 3.2 Environmental values

Vegetation along the Newell Beach foreshore has historically been heavily impacted by vegetation removal to maintain views and access, such that much of the vegetation of the foreshore is mapped as non-remnant and only a few patches of remnant vegetation remain. The coastal vegetation reserve at Newell Beach ranges from only 12 m wide to a maximum of 80 m and remnant vegetation is highly altered along its length. Vegetation on the northernmost end is intact remnant and to the south there are areas mapped as regrowth to protect the creek banks.

#### Flora composition

A desktop assessment of the vegetation mapping indicates that, with exception of the intact mangrove, hind dune and foreshore vegetation adjoining Saltwater Creek at the northern end, most of the foreshore vegetation of Newell Beach is considered non-remnant (DOR 2020). Four REs are indicated as being present and foreshore vegetation is mapped as a mix of complex open shrub and closed foredune forest. The descriptions, Vegetation Management (VM) Class, Biodiversity (BD) status and local representation of the two dominant REs are summarised in Table 2 and Figure 5. A full list of the REs at Newell Beach is provided in Attachment A. As most of the impacts relate to impacts in the residential area, vegetation ground-truthing was only undertaken in these areas.

Table 2. Regional Ecosystems of the assessed impact areas within Newell Beach

RE	Mapped RE description	VM Class	BD Status	Local representation
7.2.1c	Closed forest with Calophyllum inophyllum, Terminalia arenicola, Dillenia alata, Myristica insipida, Planchonella obovata, Millettia pinnata, and Hibiscus tiliaceus. Beach ridge deposits adjacent to the foredune, in the very wet rainfall zone.	Е	E	Highly modified canopies with coconut frequently replacing large trees. <i>Calophyllum inophyllum</i> and <i>Terminalia</i> sp. present as mature trees but recruiting saplings frequently absent or disturbed.
7.2.7a	Complex of open shrubland to closed shrubland, grassland, low woodland and open forest. Includes pure stands of Casuarina equisetifolia, and Acacia crassicarpa, Syzygium forte subsp. forte, Calophyllum inophyllum and Pandanus spp. woodland to open forest. Beach strand and foredune.	OC	E	Where Scaevola taccada would typically form a thickened shrub layer at the front of the foredune area this strata is heavily impacted through removal and the beach vines even mown in some cases. The Casuarina and Calophyllum are regularly limited to aligning with property boundaries and coconuts dominate this layer.



Local flora representation at Newell Beach



**Figure 5.** Remnant regional ecosystems at Newell Beach (DES 2021).

#### Conservation significance

The remnant vegetation of Newell Beach is mapped as 'Essential Habitat' for several conservation significant species, including the endangered southern cassowary (Casuarius casuarius johnsonii); eastern curlew (Numenius madagascariensis); great knot (Calidris tenuirostris); curlew sandpiper (Calidris ferruginea) and lesser sand plover (Charadrius mongolus) and the vulnerably listed bar-tailed godwit (Limosa lapponica baueri). Essential habitat is regulated under the Vegetation Management Act 1999 (VM Act). There are no areas mapped as high risk for protected plants in the Newell beach area.

#### Habitat fragmentation

The are no hind dune vine thickets or littoral rainforest in the main Newell Beach foreshore and connectivity between one end of the beach and the other is impacted by open canopies in many places. This would likely limit the endangered southern cassowary (*Casuarius casuarius johnsonii*) (southern population) to the northern end of the beach though the pocket of vegetation itself limited to narrow strips of connecting remnant vegetation.

There have been a number of disturbances to the foreshore area and vegetation at Newell Beach. Residential areas adjacent to the foreshore are becoming increasingly exposed to coastal hazards as a result of diminishing dune vegetation. This loss of vegetation has largely been the result of illegal clearing through the understorey. Table 3 summarises the disturbances and their potential impacts to the foreshore flora and fauna.

Table 3. Disturbances and the potential impacts to flora and fauna

Disturbance	Potential impacts to ecology
Dune erosion	<ul> <li>Further loss of vegetation and fauna habitat</li> <li>Loss of sea turtle nesting habitat through loss of the foredune vegetation</li> <li>Increase foredune slope and decreasing suitability for nesting sea turtles</li> <li>Reduced biodiversity</li> </ul>
Vegetation loss	<ul> <li>Increases in foreshore dune erosion</li> <li>Exposure of hind dune systems and vegetation that are less adapted to extreme weather events</li> <li>Loss of breeding and roosting habitat for nesting shorebirds and sea turtles</li> <li>Loss of food trees for southern cassowary</li> </ul>
Weeds	<ul> <li>Compete with native species for resources – light, nutrients, space</li> <li>Reduced biodiversity of flora</li> <li>Loss of habitat and food plants for conservation significant species</li> <li>Create barriers for connectivity and fauna population dispersal</li> </ul>
Pest animals	<ul> <li>Predation of native animals</li> <li>Sea turtle nest predation</li> <li>Reduced fauna populations and diversity</li> </ul>
Green waste and illegal dumping	<ul> <li>Impacts to marine fauna</li> <li>Damage to sea turtle nesting areas through suffocation or preventing nesting</li> <li>Introduction of weed species to natural areas</li> <li>Increased atypical fire risk</li> </ul>
Stormwater and agricultural runoff	<ul> <li>Impacts to marine fauna</li> <li>Increased sediment runoff and resulting increases in nearshore turbidity</li> <li>Increased nutrient loads and subsequent algal blooms</li> </ul>
Coconut debris	<ul> <li>Fallen fronds and fruit to reduce recruitment of native species</li> <li>Reduced opportunity for sea turtle nesting</li> <li>Increase habitat for rodents and potential bird egg predation</li> </ul>

#### Fauna

Newell Beach provides habitat features for many fauna of conservation significance, including nesting turtles, shorebirds and other notable species such as the endangered southern cassowary (*Casuarius casuarius johnsonii*) (southern population). The foredune areas are typically vegetated with larger tree species once well established. It is amongst this vegetation above the high tide mark that marine turtles prefer as nesting areas. The vegetated areas provide the ideal temperature and protection for incubation and hatchling survival. Larger trees in the foredunes also provide a roosting habitat for shorebirds during the intertidal period. The thinned vegetation at Newell Beach reduces suitable nesting and roosting sites for sea turtles and shorebirds. The full list of these species is provided in Attachment B.

#### Pest species

A number of environmental weeds species were identified during the site inspection. Coconut palm trees are one of the pest species present within the foreshore zone at Newell Beach. There are approximately 475 specimens present at Newell Beach (DSC 2015). The following additional environmental weeds were identified at Newell Beach (Table 4). Environment weeds pose a threat to the biodiversity of a habitat and can kill native vegetation, establishing a monoculture.

Table 4. Weed species identified at Newell Beach (BQ 2020, Conn 2021, DSC 2015, Murphy et al. 2016)

Scientific name	Common name	Dispersal Method	<b>Environmental Impacts</b>
Cocos nucifera	Coconut palm	<ul><li>Large nuts which fall from trees</li><li>Nuts germinate if uneaten</li></ul>	<ul> <li>Identified as a transformer weed in littoral (coastal) rainforests</li> <li>Outcompetes native species for space, light and nutrients</li> <li>Falling nuts and fronds cause physical damage to species below</li> </ul>
Sphagneticola trilobata	Singapore daisy	<ul> <li>Spreads by cuttings from slashing and pruning</li> </ul>	<ul> <li>Outcompetes native species for space, light and nutrients</li> <li>Invades lawns, irrigated areas, and around drains</li> </ul>
Sansevieria trifasciata	Mother-in-law's tongue	<ul><li>Spreads by dumping of garden waste</li><li>Seeds spread by birds and other animals</li></ul>	<ul> <li>Forms dense infestations</li> <li>Outcompetes native species for space, light and nutrients</li> <li>Tends to form monoculture</li> </ul>
Bryophyllum delagoense	Mother of millions	<ul><li>Spread by floodwaters</li><li>Spread by animals, vehicles and garden waste</li></ul>	<ul> <li>Invades coastal dunes, grasslands and woodlands</li> <li>Outcompetes native species for space, light and nutrients</li> <li>Very poisonous to humans and livestock</li> </ul>
Cenchrus echinatus	Mossman River grass	<ul> <li>Spreads via spiny burrs which become attached to animals, vehicles and clothing</li> <li>Burrs can also be dispersed by water</li> </ul>	<ul> <li>Outcompetes native plants for light, moisture and nutrients</li> <li>Burrs can injury or irritate animals and humans</li> </ul>
Agave sp.	Agave	reproduction, where a new plant grows from fragments	<ul> <li>Does not naturally grow in QLD, though 10 related species have naturalised</li> <li>Potentially invasive to native species</li> </ul>
Tradescantia sp.	Rhoea	Spreads from stem segments dispersed by	<ul> <li>Outcompetes native species for space, light and nutrients</li> </ul>

Scientific name	Common name	Dispersal Method	<b>Environmental Impacts</b>			
		water and dumped garden waste	<ul> <li>Completely covers ground layer to form dense mats up to 1m deep</li> <li>Causes dermatitis in dogs that roll in it</li> </ul>			
Urochloa mutica	Paragrass	<ul> <li>Spreads seeds by floodwater and animals</li> </ul>	<ul> <li>Aggressively invades disturbed remnant vegetation and cane-growing areas</li> <li>Strongly outcompetes native plants for space</li> </ul>			

#### Vegetation management

Douglas Shire Council has a number of instruments to manage the vegetation at Newell Beach. The Coconut Management Plan (DSC 2015) defines the objectives for the management of coconut palms on Council-controlled land. The plan identifies the coconut trees within a given location and provides an assessment of the potential risk, distribution, impacts and associated costs of management.

The Douglas Shire Biosecurity Plan (2017-2021) guides the management of invasive biosecurity matter as well as locally declared pests (plants and animals) as outlined in the Biosecurity Act 2014. Under this plan, there are programs being undertaken by DSC to eradicate pest species. Prioritisation of pest species is based on several factors, including (DSC 2017):

- Existing plans and priorities on a national, state and local level
- Impacts and threats
  - o Conservation and biodiversity
  - o Riparian or aquatic environment
  - Agricultural or production
  - o Residential and urban areas
- Capacity to manage
  - Achievability
  - Current extent

These programs include (relevant to vegetation) (DSC 2017):

- Siam Weed Eradication Program
- Hiptage eradication Program
- Miconia Species (Four Tropical Weeds Eradication Program)



DOUGLAS

**DOUGLAS SHIRE** 

**BIOSECURITY PLAN** 

# 3.3 Amenity and liveability

There is a number of facilities and access points for residents and visitors to engage in recreational activities along the Newell Beach foreshore. The accessibility and recreational uses of Newell Beach are summarised in this section and the management implications are discussed.

#### Infrastructure

Along approximately 290 m of foreshore, there are a number of recreational amenities, including barbeque facilities, a basketball court and children's playground. The use of these facilities may make people more likely to also visit the foreshore, influencing the availability of access tracks.

Boat access is available at the northern and southern ends of Newell Beach. There is a road off Marlin Parade that provides access to launch boats at Saltwater Creek. There are signs along the road to prevent illegal dumping of green waste and other items. There is also a boat ramp and jetty at the southern end of Newell Beach which is owned and managed by the Department of Transport and Main Roads (TMR). An upgrade is planned for the boat ramp at the southern end and has been well received by the community but is yet to be completed by TMR. Vehicles launching boats have the potential to cause erosion and negatively impact vegetation and essential wildlife habitats.

#### Passive recreation

Newell Beach also offers the opportunity for residents and visitors to engage in passive recreational activities. Examples of such activities include:

- walking along the beach and foreshore
- bird watching
- fishing at Saltwater Creek and Mossman River

These activities are relatively low impact but can still affect the foreshore condition. If foreshore users create informal access tracks through the vegetation to access the foreshore and beach, this can lead to a loss of vegetation, destabilisation of the sand which may lead to erosion or dune destabilisation, and it could also contribute to habitat loss and destruction. Activities such as bird watching will have similar impacts on the foreshore in relation to access. The impact of fishing will largely be a result of vehicle access to Saltwater Creek or Mossman River, including vegetation clearing for access and driving on the sand where there are important and sensitive wildlife habitats. Dumping of fishing nests or waste may also occur.

#### Pedestrian access

According to a recent audit of beach accessways in the Douglas Shire, there are 53 access paths at Newell Beach. Seven of these are formalised access paths, 13 are private accessways to houses, and the remainder are informal access paths. The creation of informal access tracks present challenges to foreshore management, particularly with regards to illegal vegetation clearing, which may result in dune destabilisation.

#### Dog off-leash areas

There is an off-leash dog area at the northern end of Newell Beach, including the foreshore area to the end of Marine Parade north of Phillip Street. Dogs pose a risk to fauna as they may attack vulnerable species, particularly when off-leash.

# 4 Management precincts

The Newell Beach foreshore area has been divided into six management precincts to tailor management actions specific to the concerns within each precinct. The six precincts are:

- Precinct 1 Saltwater Creek access
- Precinct 2 Saltwater Creek access to Phillips St
- Precinct 3 Phillips St to Pacific St
- Precinct 4 Pacific St to Newell Beach Park
- Precinct 5 Newell Beach Park to Short St
- Precinct 6 Short St to Mossman River



**Figure 6.** Newell Beach foreshore management precincts.

The threats and challenges within each management precinct are summarised in Table 5. These threats and challenges have been identified through the background review, site inspections and community engagement.

Table 5. Newell Beach foreshore precincts threats and challenges

Precinct	Key foreshore threats and challenges
1 – Saltwater Creek  Unpopulated precinct and falls under land for conservation.	<ul> <li>Illegal dumping, including green waste – this may be contributing to the spread and establishment of weeds that are present and can negatively impact native vegetation communities and does not meet the outcomes of the Conservation zone code, including biological diversity and ecological integrity.</li> <li>Informal access tracks through land designated to Conservation, including illegal vegetation clearing – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity.</li> </ul>
2 – Saltwater Creek to Phillips St  Sparsely populated precinct with land designated to conservation.	<ul> <li>Informal access tracks and viewing windows, including illegal vegetation clearing – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity.</li> <li>Environmental weeds present – may impact the conservation value within the precinct.</li> <li>Foreshore access within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas</li> </ul>
3 – Phillips St to Pacific St  Land designated to conservation and more densely populated residential zone adjacent.	<ul> <li>Informal access tracks, including illegal vegetation clearing and sparse vegetation cover         <ul> <li>these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity.</li> </ul> </li> <li>Environmental weeds present – may impact the conservation value within the precinct.</li> </ul>
4 – Pacific St to Newell Beach Park  Foreshore along Marine Parade with land dedicated to conservation.	<ul> <li>Informal access tracks, including illegal vegetation clearing and sparse vegetation cover         <ul> <li>these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity.</li> </ul> </li> <li>Environmental weeds present – may impact the conservation value within the precinct.</li> </ul>
5 – Newell Beach Park to Short St  Land designated to conservation and residential area immediately adjacent.	<ul> <li>Environmental weeds present – may impact the conservation value within the precinct.</li> <li>Illegal vegetation clearing and sparse vegetation cover – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity.</li> </ul>
6 – Short St to Mossman River  Land designated to conservation and community facilities.	<ul> <li>Pedestrian and other access along foreshore within potential sensitive and vulnerable habitats – access may pose a threat to vulnerable species.</li> <li>Environmental weeds present – may impact the conservation value within the precinct.</li> </ul>

# 5 Management plan

The following section outlines the adaptive management approach to address the threats and challenges that have been identified for the Newell Beach foreshore area. The objectives for management have been identified in order to inform measurements for management success. Priorities have also been set to appropriately guide management of the foreshore threats and challenges over the immediate, medium and longer-term timeframes. The objectives and priorities shape the management actions for each precinct. In addition, any monitoring and evaluation activities that are to take place following the implementation of the actions will also be summarised to measure the progress of the foreshore management.

## 5.1 Management objectives

Objectives are useful for measuring the success of the management actions undertaken. They are based on the community values identified through the engagement process. The objectives will guide the metrics for monitoring and evaluation of the management actions. They can be applied at the whole of foreshore (community) and precinct scale.

## Management objectives for Newell Beach foreshore

- Maintain the overall natural form and function of the beach.
- Enhance and maintain vegetation condition littoral rainforests, dune vegetation for vulnerable species and to prevent dune erosion.
- Build positive behaviour change outcomes to minimise adverse impacts of foreshore use.
- Proactively undertake weed management to restore native vegetation habitats.
- Monitor the presence and health of potential turtle and shorebird nesting sites in foreshore areas.
- Enforce illegal clearing local laws to prevent further establishment of unauthorised and informal beach access tracks.

## 5.2 Management prioritisation

Prioritisation of the management actions has been assigned as immediate, medium-term or future.



Immediate (recommend implementation within next 12 months)

Actions for immediate prioritisation include sites where weeds are present and it is necessary to eradicate the weeds and revegetate the site with native vegetation cover. Environmental weeds pose a significant threat to the values of the Newell Beach residents, including the natural habitats and wildlife. Actions also revolve around access and use of the foreshore area, such as for fishing or pedestrians. The uses may pose a threat the sensitive habitats and management actions are focussed on minimising the impact.



**Medium-term** (recommend implementation within next 2-3 years)

Medium term priority actions are recommended to be implemented within the next two to three years. These actions are important for the management of the foreshore precinct, however, they require community engagement and education to understand their benefits. There is an element of community involvement with the medium-term actions.

# 5.3 Management actions

Management actions and their priorities for the Newell Beach foreshore are summarised in Table 6. Maps of the management actions for each precinct are provided in Attachment C.

Table 6. Newell Beach foreshore precinct management objectives and actions

Concerns and management actions	All precincts	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Objective 1: Protect sensitive and vulnerable habitats, including dune vegetation	n, and turtle an	d shorebird nes	ting sites.				
<u>A1.1:</u> Undertake beach monitoring for turtle and shorebird nesting sites in collaboration with local environmental groups and residents during nesting and hatching seasons to understand the impact access and disturbed foreshore vegetation habitats may have on these environments. Survey vegetation cover to assess revegetation requirements to support nesting.			1	1	1	1	1
<u>A1.2:</u> Formalise and maintain defined access tracks and install appropriate signage at the beach and land entrance. This is to minimise the impact on the frontal dune.	1						
Objective 2: Restore the biological diversity, ecological integrity, scenic amenity	and dune stab	ility of the foresl	hore by reducinย	g the presence a	nd impact of env	ironmental wee	ds.
<u>A2.1:</u> Commence a dune protection and maintenance program in partnership with community and environmental groups using Newell Beach as a pilot site. Undertake dune revegetation with native species (see Attachment D) within a 10 m buffer landward of the HAT mark with low-growing species to maintain views, and regenerate land that has been cleared and to stabilise the dune protecting against erosion.			2	2	2	1	
<u>A2.2:</u> Establish a weed eradication and maintenance program in collaboration with local environmental and community groups to remove environmental weeds present in the foreshore area and undertake revegetation with native species (see Attachment D).	1						

Concerns and management actions	All precincts	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
<u>A2.3:</u> Undertake a community education program to communicate knowledge around foreshore weeds, including transfer and establishment, awareness and management, and the benefits of dune vegetation.	1						
<u>A2.4:</u> Offer residents of Newell Beach free green waste disposal at Newell Transfer Station before and after wet season to encourage clearing and appropriate disposal of garden waste and hazardous vegetation (e.g., weeds).	1						

## 5.4 Monitoring and evaluation

The success of the immediate priority management actions is measured through monitoring and evaluation mechanisms. The monitoring focusses on the sensitive and vulnerable environments, including turtle nesting and key coastal vegetation habitats.

#### **Nesting habitats**

The habitat monitoring will be undertaken to observe where turtle nesting habitats are present in the foreshore area and to understand the vegetation composition of these habitats. Turtle monitoring should be undertaken based on the Queensland Marine Turtle Field Guide (Attachment E) between November and March to understand the seasonal use of these habitats by turtles (QPWS, DES 2016). It is recommended that the monitoring be undertaken in partnership with local community environmental groups. In addition, a platform on the DSC website should be created for residents and visitors to submit photos and information regarding any turtles they notice when using the foreshore.

#### Vegetation

The vegetation monitoring is a simple measure for the percentage of cover and survival success. This monitoring should be undertaken on a yearly basis to record the survival rate. It is recommended that vegetation is monitored on a yearly basis as the end of the wet season.

The purpose of collecting information about the success of revegetation and other site management issues such as exotic plants (environmental weeds), other threats, habitat quality and connectivity, and significant species values is to be able to refine and direct resources accordingly. Flexibility in program delivery is required to maintain the condition of assets such as plantings, respond to threats as they change through time and account for new values if they emerge during the delivery of the project.

#### Monitoring and evaluation metrics

Table 7 outlines the monitoring and evaluation metrics for the corresponding management action to evaluate the progress and success of implementation. A detailed method for rapid vegetation assessment is supplied in Attachment E.

Table 7. Foreshore management action monitoring and evaluation metrics

Management action	Monitoring	Evaluation	Timing	
Fauna monitoring	<ul><li>Nesting species</li><li>Vegetation composition of nesting habitats</li></ul>	<ul><li>Turtle tracks, bird nests</li><li>Population dynamics</li><li>Animal health</li></ul>	Nesting season	
Vegetation monitoring	<ul> <li>Species specific observations to identify which species may be doing poorly</li> <li>Weed cover within each of the canopy layers (top 5 transforming weed species)</li> </ul>	<ul> <li>Measure of the percentage survival of revegetation</li> <li>Percentage survival of key species</li> <li>Percentage cover over canopy layers of weeds</li> <li>Percentage of bare/disturbed ground</li> <li>Natural recruitment</li> <li>Habitat connectivity</li> <li>Significant species</li> </ul>	Annual	

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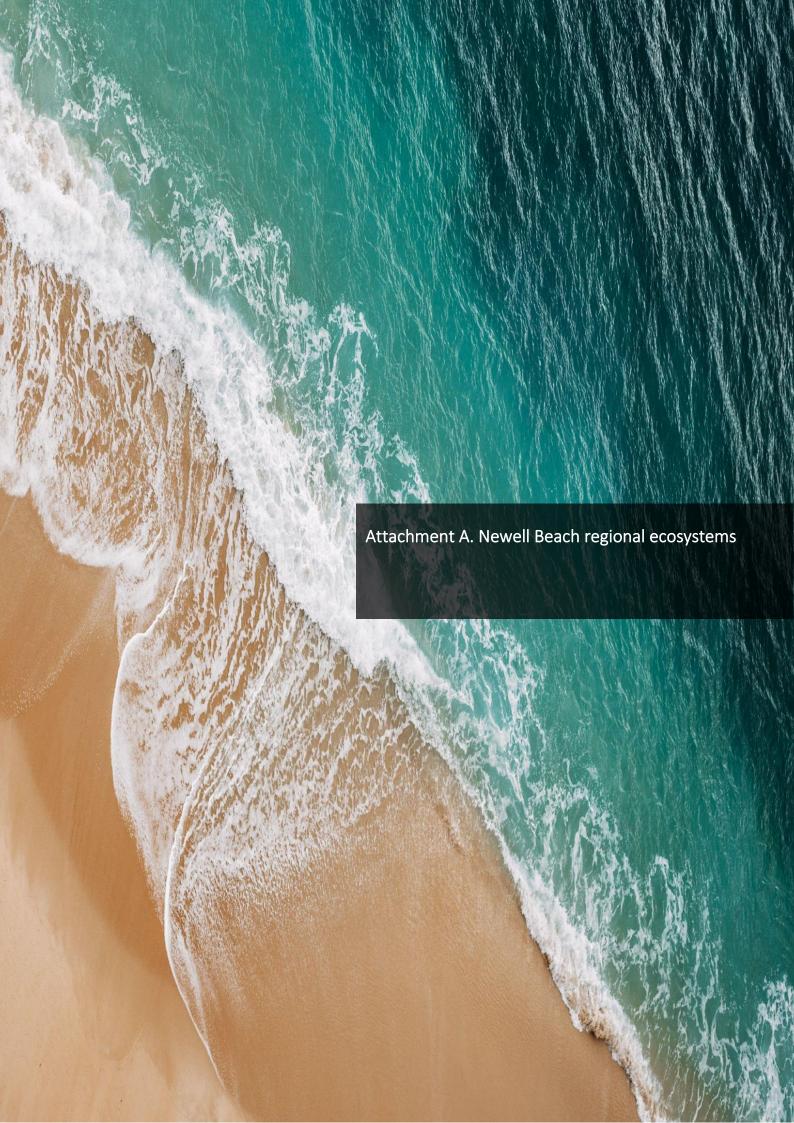


Table 8. Newell Beach regional ecosystems (REs)

RE	Description	VM Class	BD Status
7.1.1	Mangrove closed scrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide.	LC	NC
7.2.1	Mesophyll vine forest on beach ridges and sand plains of beach origin	E	E
7.2.3a	Corymbia tessellaris, C. clarksoniana (and/or C. intermedia), Melaleuca dealbata +/- Lophostemon suaveolens woodland to closed forest, with Acacia mangium, A. crassicarpa, Canarium australianum and Deplanchea tetraphylla. Unweathered low prograding beach dunes, predominantly of Holocene age.	OC	OC
7.2.7	Casuarina equisetifolia +/- Corymbia tessellaris open forest +/- groved vine forest shrublands on strand and foredunes	OC	E

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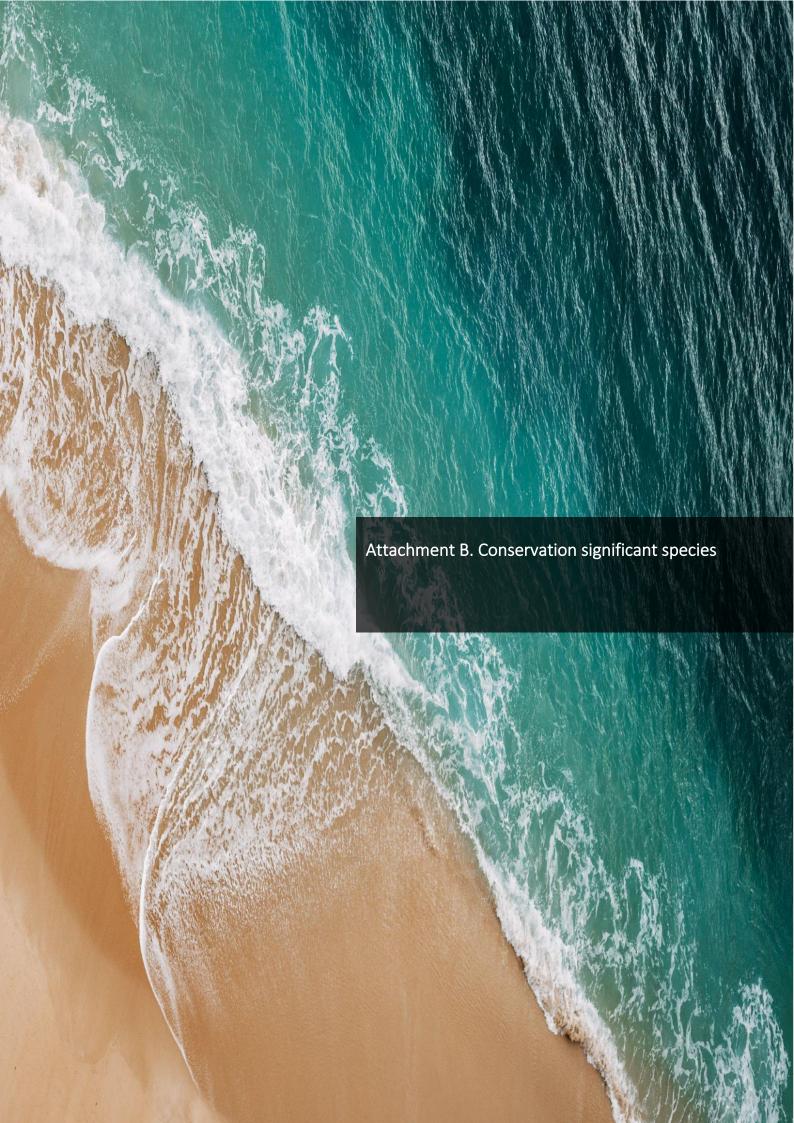
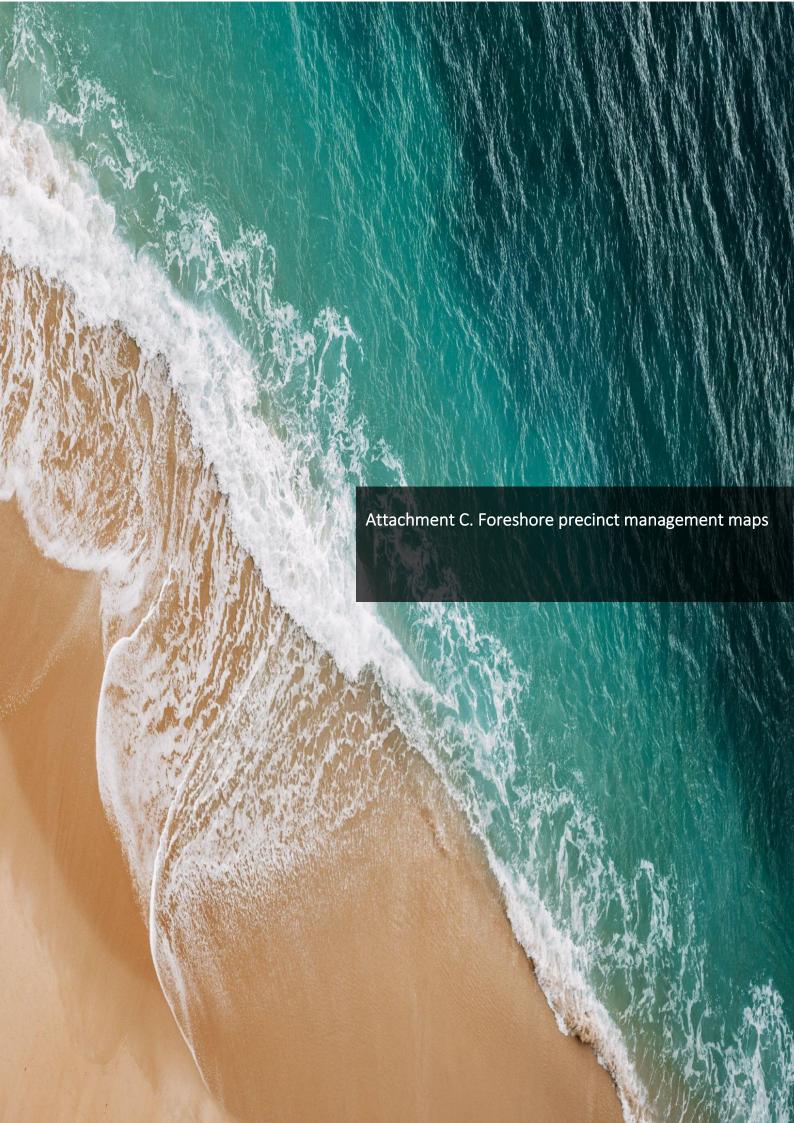
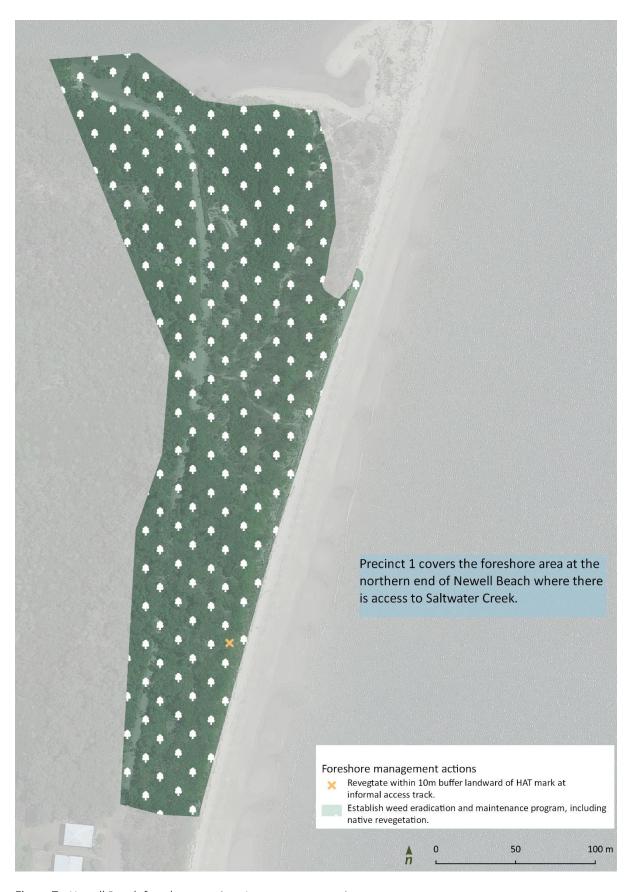


Table 9. Conservation significant fauna at Newell Beach and likelihood of occurrence

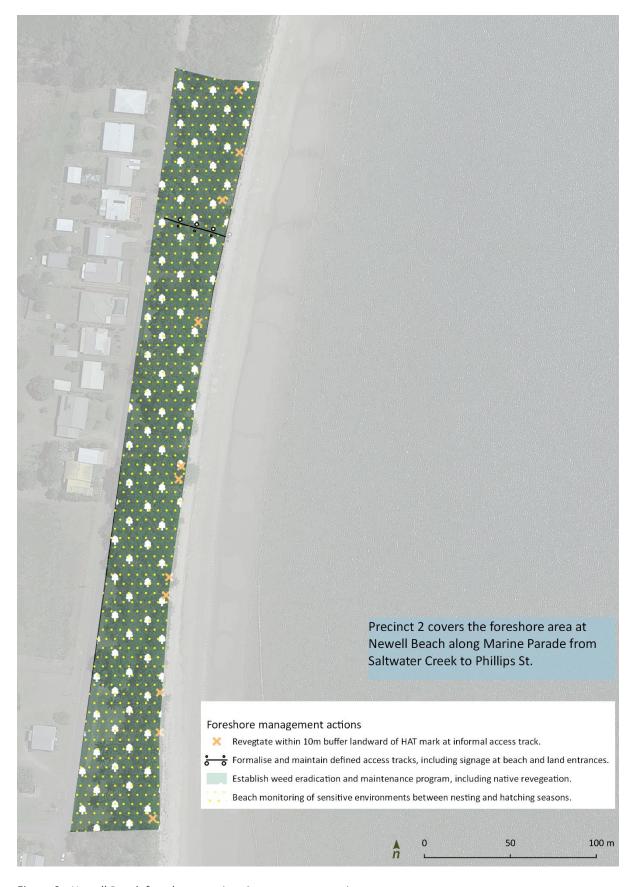
Scientific name	Common name	EPBC Act	NC Act	Likelihood of occurrence
		Shorebirds		
Esacus magnirostris	Beach-stone curlew	_	V	Likely
Casuarius casuarius johnsonii	Southern cassowary	E	E	Possible
Calidris ferruginea	Curlew sandpiper	CE	CE	Likely
Numenius madagascariensis	Eastern curlew	CE	E	Likely
Charadrius mongolus	Lesser sand plover	E	E	Likely
Charadrius leschenaultii	Greater sand plover	V	V	Likely
Calidris canutus	Red knot	E	E	Likely
		Sea turtles		
Natator depressus	Flatback turtle	V	V	Likely
Chelonia mydas	Green turtle	V	V	Likely
Eretmochelys imbricata	Hawksbill turtle	V	E	Likely
Dermochelys coriacea	Leatherback turtle	E	E	Possible
Caretta caretta	Loggerhead turtle	E	E	Likely
Lepidochelys olivacea	Olive ridley turtle	E	E	Likely
		Other		
Hirundapus caudacutus	White-throated needletail	V	V	Likely
Cyclopsitta diophthalma macleayana	Macleay's fig-parrot	_	V	Likely
Crocodylus porosus	Estuarine crocodile	_	V	Likely

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**Figure 7.** Newell Beach foreshore precinct 1 management actions.



**Figure 8.** Newell Beach foreshore precinct 2 management actions.



**Figure 9.** Newell Beach foreshore precinct 3 management actions.



**Figure 10.** Newell Beach foreshore precinct 4 management actions.



**Figure 11.** Newell Beach foreshore precinct 5 management actions.



**Figure 12.** Newell Beach foreshore precinct 6 management actions.

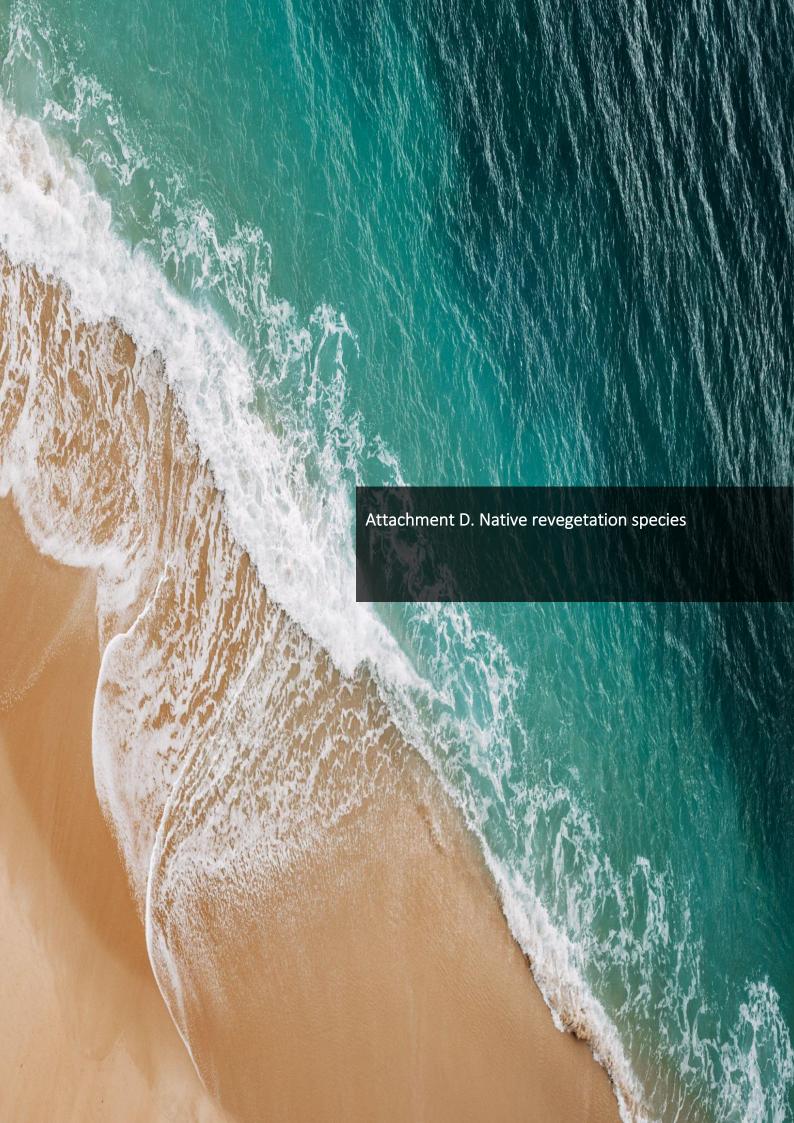


Table 10. Native revegetation species (Florentine, Pohlman and Westbrooke 2015)

Botanical name <sup>1</sup>	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Acacia	Northern golden						
crassicarpa	wattle						•
Acacia mangium	Broadleaf salwood						<b>~</b>
Acacia oraria	Coastal wattle						~
Aglaia	Coastal						
elaeagnoidea	boodyarra						•
Alphitonia petriei*	Sarsaparilla		•	•	•		
Alyxia spicata	Chain fruit		<b>~</b>				•
				•			
Atractocarpus fitzalanii	Brown gardenia			•	~	•	•
Barringtonia	Mango bark,						
asiatica	Mango pine						
Barringtonia calyptrata	Mango pine						<b>~</b>
Beilschmiedia obtusifolia	Blush walnut						<b>~</b>
Blepharocarya involucrigera	Rose butternut						<b>~</b>
Brachychiton	Illawarra flame						
acerifolius	tree						•
Breynia cernua	Fart bush		•	<b>✓</b>	<b>✓</b>	•	~
Calophyllum	Beach						
inophyllum	calophyllum						•
Calophyllum sil	Blush touriga						
Canarium vitiense	Canarium						~
Carallia brachiata	Corky bark,						
	Fresh water						~
	mangrove						

 $<sup>^{1}</sup>$  \* denotes pioneer species that will grow and establish quickly, allowing for natural recruitment or planting of secondary species.

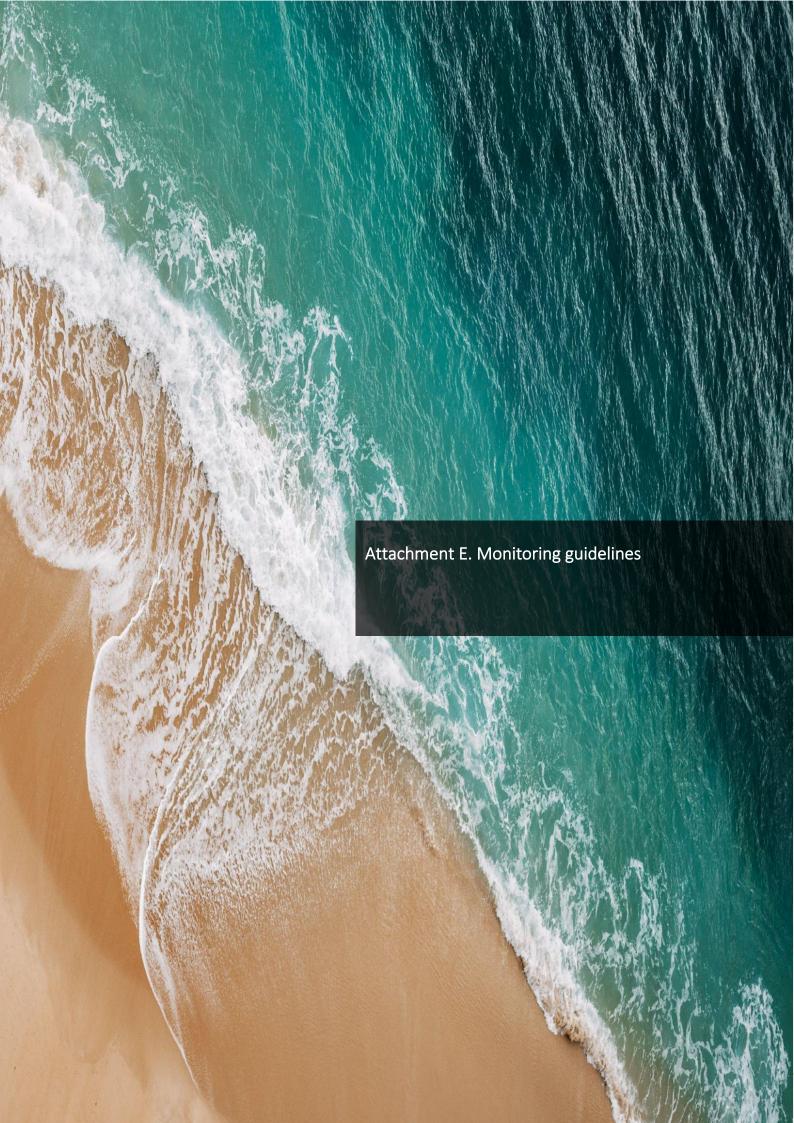
Botanical name <sup>1</sup>	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Casuarina equisetifolia	Beach casuarina	•	•	•	•	•	•
Cerbera manghas	Sea mango	~	~	<b>✓</b>	<b>~</b>	•	<b>✓</b>
Chionanthus ramiflora	Native olive	•					~
Clerodendrum longiflorum	Long flowered clerodendrum	•	•	•	•	•	•
Colubrina asiatica	Beach berry bush	•	•	•	•	•	<b>~</b>
Cordia subcordata	Sea trumpet	•	•	•	•	•	~
Crinum pedunculatum	Beach lily, Swamp lily	<b>~</b>	•	•	•	•	<b>~</b>
Cupaniopsis anacardioides	Beach Tamarind	<b>~</b>					<b>✓</b>
Deplanchea tetraphylla	Golden bouquet tree	•	•	~	•	•	•
Dillenia alata	Red beech	•					<b>✓</b>
Diospyros compacta	Australian ebony	•	•	•	•	•	•
Dodonea viscosa	Hop bush	•					~
Elaeodendron melanocarpum	False olive	•	•	•	•	•	~
Eucalyptus plattyphylla	Ghost gum						
Euroschinus falcata*	Pink poplar		•	•	•		
Ficus benjamina	Weeping fig	•	•	•	•	•	<b>✓</b>
Ficus drupacea	Drupe fig	•					~
Ficus microcarpa	Small fruited fig	•					~
Ficus opposita	Sandpaper fig	•					<b>✓</b>
Ficus racemosa	Cluster fig	•					<b>~</b>

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Botanical name <sup>1</sup>	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Ganophyllum falcatum	Daintree hickory	•					~
Glochidion harveyanum	Harvey's buttonwood	•	•	~	<b>~</b>	<b>~</b>	<b>✓</b>
Glochidion philippicum	Daintree cheese tree	•					•
Gmelina dalrympleana	White beech	•	•	•	•	•	•
Gomphandra australiana	Buff beech	•	•	~	•	~	•
Guioa acutifolia*	Glossy tamarind		~	•	<b>✓</b>		
Haemodorum coccineum	Blood root	•	•	•	•	•	•
Hibiscus tiliaceus	Coast cottonwood	•	•	•	•	•	~
Intsia bijuga	Kwila	•					~
Ipomoea pes- caprae	Coastal morning glory	•	•	•	•	•	<b>~</b>
Jagera pseudorhus	Foambark	•					~
Livistona muelleri	Northern Cabbage Tree Palm	•					<b>~</b>
Lophostemon suaveolens	Swamp mahogany, swamp box						
Macaranga tanarius	Kamala, Blush macaranga	•					•
Mallotus philippensis	Red Kamala	•					•
Maytenus fasciculiflora	Orangebark						
Melaleuca leucadendra	Weeping paperbark						

Botanical name <sup>1</sup>	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Melaeuca viridiflora	Broad leaved paperbark						
Melia azederach	White cedar						
Micromelum minutum	Lime berry	•					•
Miliusa brahei	Rasberry jelly plant	•					~
Millettia pinnata	Pongamia tree	~					<b>✓</b>
Mimusops elengi	Red coondoo	<b>~</b>					<b>✓</b>
Mischocarpus exangulatus	Red bell mischocarp	•	•	•	•	•	•
Morinda citrifolia	Rotten cheesefruit	•					~
Pandanus tectorius	Beach pandan	•					•
Pittosporum ferrugineum	Rusty pittosporum	<b>~</b>	•	•	•	•	<b>~</b>
Planchonia careya	Cocky apple	•					•
Pleiogynium timorense	Burdekin plum	•					•
Polyscias elegans	Celerywood	<b>✓</b>					<b>✓</b>
Pouteria chartacea	Thin leaved coondoo	•	•	•	•	•	•
Pouteria obovata	Yellow boxwood	~	~	•	<b>✓</b>	<b>✓</b>	<b>✓</b>
Premna serratifolia	Coastal premna	•	•	~	•	•	•
Ptychosperma elegans	Solitaire palm						•
Rhus taitensis	Sumac	•					~
Scaevola taccada	Beach lettuce	•	•	•	•	•	~
Schefflera actinophylla	Umbrella tree	•					<b>~</b>

Botanical name <sup>1</sup>	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Scolopia braunii	Brown birch	<b>~</b>					<b>✓</b>
Sterculia quadrifida	Peanut tree	~					~
Syzygium angophoroides	Yarrabah satinash	<b>V</b>					•
Syzygium hemilamprum (Syn. Acmena hemilampra)	Blush satinash	V					•
Tarenna dallachiana	Tree ixora	<b>~</b>					~
Terminalia arenicola	Brown damson	<b>~</b>					~
Terminalia catappa	Indian almond	<b>~</b>					~
Terminalia microcarpa	Damson plum	<b>~</b>					•
Terminalia muelleri	Mueller's damson	<b>~</b>					•
Thespesia populneoides	Tulip tree	<b>~</b>					•
Timonius timon	False fig	<b>~</b>					~
Vitex rotundifolia	Beach vitex	<b>~</b>	•	•	•	•	<b>✓</b>
Vigna marina	Beach pea	•	•	•	•	•	•

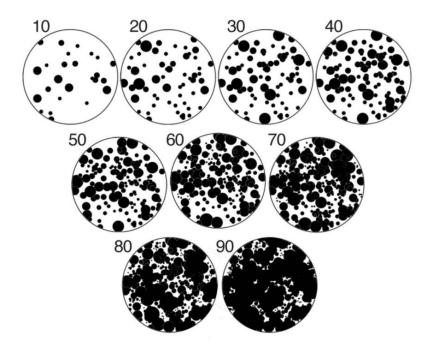


# Rapid Vegetation Assessment Method Data collection

	Survey ID	Description of survey					
ک ر	Assessor Name/s	Descriptive text					
surv		Descriptive text					
General survey information	Date of record	Date					
<u>ن</u> ق	Assessment number	Assessment	1	2	3	4	5
	General Location	Descriptive text					
cation	Easting	GPS spatial data					
Specific location	Northing	GPS spatial data					
Sp	Spatial uncertainty	GPS spatial data					
		Desi	red cover by year !	5			
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Ovei							
		Cur	rent overall cover				
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
		Percenta <sub>l</sub>	 ge survival of each	layer			
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
		Species	specific observati	ions			
	% Un	derstorey	% Mid-	-storey	% Ove	erstorey	%
Sp. 1							
Sp. 2							
Sp. 3			1				
Sp. 4							

Sp. 5							
		Env	vironmental weeds co	ver			
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
		High t	hreat environmental	weeds			
	0/				0/ 0		0/
	%	S Understorey	% IVIIQ	-storey	% OV6	erstorey	%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							
Sp. 5							
		Bare gr	ound created by distu	ırbance			
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Vehicles		- ( 7	- ()	(====)	(== := )	- (	
People							
Erosion							
Other							
			Natural recruitment				
		Absent	Pre	sent		%	
Under							
Mid							
Over							
			Connectivity				
			Connectivity				
	Patch size (ha)		Distance (km)		Connection		
Patch 1					Н	М	L
Patch 2					Н	М	L
Patch 3					Н	М	L
		Sigr	 nificant species identi	fied			
	Location	Population size	Threat		Proposed res	sponse	

Sp. 1		
Sp. 2		
Sp. 3		



**Figure 13.** Schematic representation of percentage cover categories.

# Queensland Marine Turtle Field Guide











Queensland's coast has some of the most important marine turtle nesting sites in the world. Six species of threatened marine turtles nest along our idyllic beaches. These rookeries support significant nesting populations of green, loggerhead, hawksbill, flatback and olive ridley turtles.

One of the most serious threats to nesting turtle populations is the destruction of their eggs and hatchlings by predators. Feral pigs have been found to be responsible for destroying over 70 per cent of turtle nests at nesting beaches on Cape York, continued loss at this rate is not sustainable. Other predators include foxes, dogs, dingoes and goannas.

To reduce predation on marine turtle nests and help the recovery of threatened marine turtle populations, the Australian and Queensland Governments have together invested nearly \$7million in the Nest to Ocean Turtle Protection Program. The program supports predator control and turtle monitoring at priority nesting beaches. It also assists Traditional Owner and

community groups to increase their participation in these important activities.

This field guide has been developed as part of the Nest to Ocean Turtle Protection Program. Correctly identifying marine turtles, and the animals that prey on their nests, provides valuable information about turtle populations and shows where predator control activities are most needed.

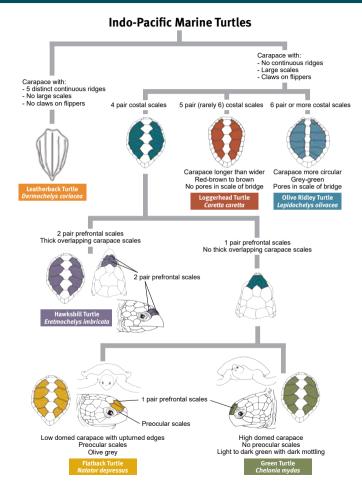




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# **Marine Turtle Species Identification Key**



# **Photographs of Adults and Hatchlings**







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Hawksbill Turtle Eretmochelys imbricata

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Loggerhead Turtle Caretta caretta

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Flatback Turtle Natator depressus

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Leatherback Turtle Dermochelys coriacea

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# Marine Turtle Track Identification Key

#### **Alternating Stroke**

Flipper marks alternate



#### **Track Features**

Early morning monitoring is best as tracks will deteriorate over time. The clarity of tracks can be affected by flipper damage, terrain, sand moisture, tides, wind and weather. Look for several key identifying features, along different sections of track.

The key track identification features are:

- Stroke Style
- · Track Width
- · Hind Flipper Marks
- Front Flipper Marks
- Plastron Drag
- · Tail Drag



#### Loggerhead

Track Width Less than 1 meter

**Hind Flipper** 

Front Flipper

Plastron Drag

Tail Drag Not present



#### Hawksbill

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag



#### Olive Ridley

Track Width Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag





Flipper marks side by side





#### Green

Track Width Approx. 94-144 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag



Track Width Approx. 90-100 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

#### **Track Direction**

Clues to determine track direction:

Turtles push sand backwards, the higher sand mound is at the back

If track overlaps, the top track is the returning track.

Sand is always thrown back over the emerging track when digging.

#### Measuring Width

Measure from outer edge of track. This may be the front or rear flipper, depending on species.

#### Leatherback

Track Width Greater than 2 meters

Hind Flipper

Front Flipper

Plastron Drag Not Visible

Tail Drag



# **Basic Beach Monitoring**

Guidelines on how to **Record** data and implement **Action** during a basic beach survey (see page 9). These may be tailored to suit individual monitoring programs and implemented in accordance with training.

#### Record

**Species Identification:** Use track or sighting to identify species.

**GPS Nest Location:** Note GPS coordinates & waypoint number.

False Crawl: Track with no nest.

**Extent of Damage:** Partial or complete destruction of nest.

**Evidence of Predation:** Diggings, tracks, sighting.

**Predator Identification:** Use track or sighting to identify species.

**Hatchlings Emerged:** Yes, hatchling tracks or sighting.

**Tag Information:** Note tag ID number and its location on turtle.

Curved carapace length (CCL): From front (where skin and carapace meet), down midline to back edge of carapace (over tail).



#### Action

**Photograph:** To verify species and/or nest damage/predation.

**Mark Nest:** Install marker to indicate nest location (if required).

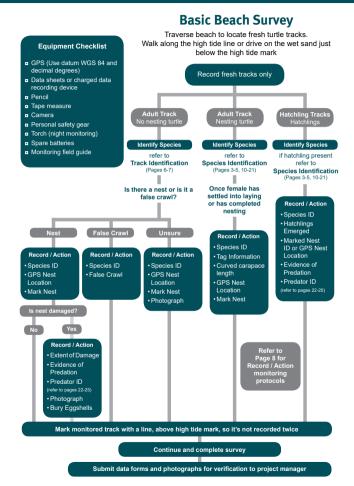
Bury Eggshells and Mark Track: To avoid record duplication; mark track line above the high tide mark.

**Submit Data:** Project manager to submit data to the relevant Queensland Department.





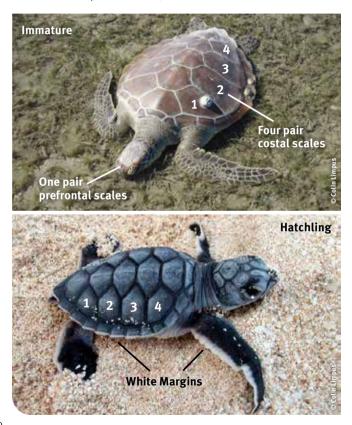






# Green Turtle, Chelonia mydas

Status: Nationally Vulnerable, Queensland Vulnerable



# **Key Identification Features**











Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

1 Pair Prefrontal Scales

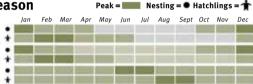
**Qld Nesting Sites** 

**Adult**: Carapace is a high dome. Colour is light to dark green with dark mottling. Plastron colour is cream-white.

Hatchling: Black-dark brown with white margins, white plastron.

## **Breeding Season**











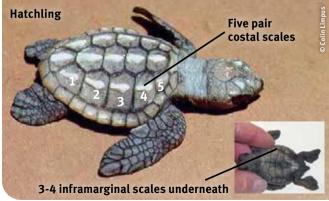




# Loggerhead Turtle, Caretta caretta

Status: Nationally Endangered, Queensland Endangered





# Loggerhead Turtle

# **Key Identification Features**









Alternating Track

Carapace Scales

5 Pair Costal Scales

Qld Nesting Sites

**Adult**: Carapace is longer than wider. Colour is red-brown to brown. Plastron colour is yellow.

**Hatchling**: Dark brown with 5 costal scales and dark plastron with 3-4 inframarginal scales.

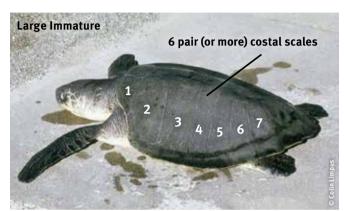
# Breeding Season Peak = Nesting = Hatchlings = The start of the start





# Olive Ridley Turtle, Lepidochelys olivacea

Status: Nationally Endangered, Queensland Endangered





# **Olive Ridley Turtle**

## **Key Identification Features**









Alternating Track

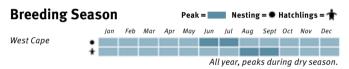
Carapace Scales

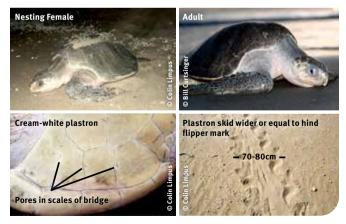
6 Pair (or more) Costal Scales

**Qld Nesting Sites** 

**Adult:** Carapace is circular. Colour is grey-green with no conspicuous markings. Plastron colour is cream-white.

Hatchling: Charcoal-grey/black-brown on both sides.



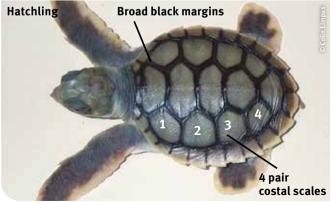




# Flatback Turtle, Natator depressus

Status: Nationally Vulnerable, Queensland Vulnerable





# **Key Identification Features**











Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

1 Pair Prefrontal Scales

**Qld Nesting Sites** 

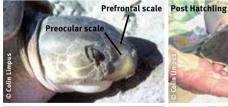
Nesting = ● Hatchlings = ★

Adult: Carapace is a low dome, smooth with upturned edges. Colour is grey to pale-grey or olive. Preocular scales. Plastron is creamy-yellow. Hatchling: Olive-green, scales with broad black margin. Plastron is a solid white.

#### **Breeding Season**









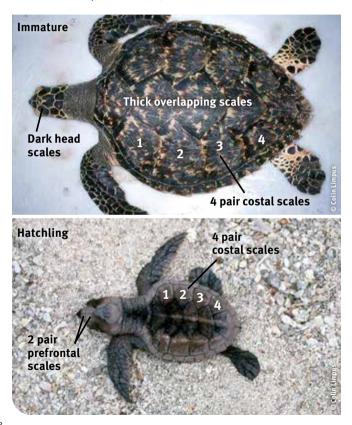






# Hawksbill Turtle, Eretmochelys imbricata

Status: Nationally Vulnerable, Queensland Vulnerable



# **Key Identifcation Features**











Alternating Track

Scales Thick Overlapping

4 Pair Costal Scales

2 Pair Prefrontal Scales

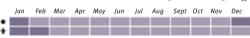
**Qld Nesting Sites** 

**Adult**: Carapace has thick overlapping scales. Colour is olive green or brown and is extensively variegated with brown/black markings. Adult plastron is yellow or white with black spots.

Hatchlings: Dark brown.

#### **Breeding Season**

Northern Great Barrier Reef and Torres Strait









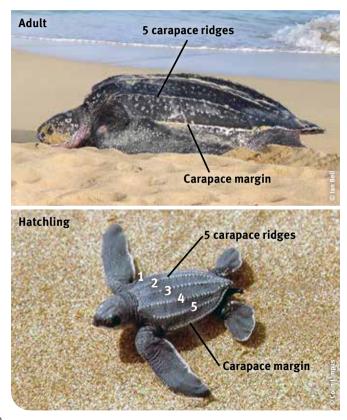
Peak = Nesting = Hatchlings = ★





# Leatherback Turtle, Dermochelys coriacea

Status: Nationally Vulnerable, Queensland Endangered



#### Leatherback Turtle

# **Key Identification Features**









Breast Stroke Track

No Carapace Scales

5 Carapace Ridges

**Qld Nesting Sites** 

**Adult:** Carapace is long and pointed. Long ridges run down the length of carapace. Colour is a uniform black-brown. Soft leathery skin.

**Hatchlings:** Finely beaded, black with white markings on the carapace ridges and plastron.

Apr

# **Breeding Season**







South Eastern Queensland

Adult





Aug





#### **Predator Track Identification**

#### **Fox**

Straight track, hind feet reusing front feet impressions

Small track

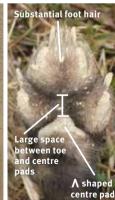
width







- Front foot is larger than back foot.
- Elongated oval shaped claws, may not show on track.
- Substantial foot hair, sometimes visible on track impression.
- Large space between centre pad and toe pads.
- Centre pad has a distinct inverted V shape.
- Tracks are straight, hind feet reusing front feet impressions.
- · Small track width.







#### **Management Options**

- Den detection and fumigation
- Ground shooting
- TrappingBaiting
- Exclusion fencing
- Nest protection (cages)



# Wild Dog or Dingo

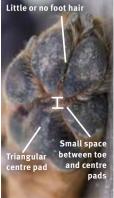




#### **Track Identification Features**

- Front foot is larger than back foot.
- Little or no foot hair in between pads.
- Small space between centre pad and toe pads.
- Centre pad almost triangular.
- Foot imprint rounded.
- Tracks are straight but not as neat and aligned as a fox's track.







Front



Back

#### **Management Options**

- Ground shooting
- Leg hold trapping
- Baiting (1080 or strychnine)
- · Exclusion fencing
- Nest protection (cages)

# **Feral Pig**



Pigs eat 100 percent of nest eggs, predating many nests per night

#### **Track Identification Features**

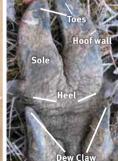
- Back feet slightly larger than front.
  - Foot print consists of a two toe hoof and two dew claws.
  - Dew claws distinctive identification feature but may not be present in harder soils.
  - Small stride and narrow straddle.



Dew claw visible in sand impression









- Ground/aerial shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)





#### Goanna



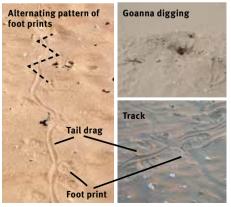
#### **Track Identification Features**

- Both walk and run tracks have alternating foot prints.
- Trail drag usually visable.



#### Nest Predation Identification

- Goannas burrow into nest at an angle from the side of the nest, not vertical from directly above.
- The burrow is typically domed shape, not circular.



#### **Management Options**

- Trapping
- Exclusion fencing
- Nest protection (cages)

# **Principles of Pest Management**

Managing pest animals requires long-term control programs and a variety of approaches. Effective programs are designed around these eight principles:

#### 1. INTEGRATION

Ensuring pest management programs are an integral part of the management of natural areas.

#### 2. PUBLIC AWARENESS

Raising public awareness and knowledge of pests to increase community and individual participation in pest management.

#### 3. COMMITMENT

Gaining a commitment to long term programs by the community, industry groups and government entities.

# 4. CONSULTATION AND PARTNERSHIP

Establishing partnerships between local communities, industry groups, state government agencies and local governments to achieve a collaborative approach.

#### 5. PLANNING

Consistent planning at local, regional, state and national levels ensures combined resources target the agreed priorities.

#### 6. PREVENTION

Preventing the spread of pests, and using early detection and intervention to control pests.

#### 7. BEST PRACTICE

Using ecologically and socially responsible pest management practices to protect the environment and natural resources.

#### 8. IMPROVEMENT

Research and regular monitoring and evaluating of programs helps improve and refine pest management practices.



#### **Threats to Marine Turtles**

Marine turtles are long-lived and slow to mature. Depending on the species they can take anywhere between 8–50 years to reach breeding age. Due to the range of threats, at their different life stages, it is thought that only 1 in 1000 hatchlings will survive to adulthood and then return to the beach to nest. For this reason it is critical to address the range of threats throughout their lifecycle.

#### Threats include:

- Native and introduced animals predating turtle eggs and hatchlings.
- Vehicles compacting turtle nests or forming tyre ruts that trap hatchlings.
- Humans taking turtle eggs.
- Bycatch of marine turtles in fisheries.
- · Marine debris.
- Impact to breeding habitat from coastal development and artificial lighting.
- Deteriorating water quality.
- Unknown and possibly unsustainable levels of turtle harvesting, in and outside Australian waters.

#### What you can do:

- Support the management of predators such as pigs, dogs and foxes around turtle nesting beaches.
- Report turtle nests and predated turtle nests to your local ranger.
- Keep your dogs on a lead when walking on the beach during nesting/hatchling season.
- Drive slowly on beaches and avoid driving over nests. Drive on the wet sand below the high tide mark to avoid making wheel ruts.
- Pick up marine debris from the beach and waterways.
- Report ghost nets to your local ranger.
- At night, minimise lights on the beach, including campfires.
- Support sustainable, traditional use of adult turtles and turtle eggs.

#### **Acknowledgements**

The Queensland Parks and Wildlife Service Nest to Ocean Turtle Protection Program Team would like to acknowledge the contribution of staff from the following organisations in the development of the field guide: Western Cape Turtle Threat Abatement Alliance supported by Cape York Natural Resource Management, Balkanu Cape York Development Corporation, Aak Puul Ngantam, Feralfix, World Wildlife Fund for Nature, and University of Oueensland, Also acknowledged is the input and advice of staff from our partnering Australian and Queensland Government departments.

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Green Turtles on Raine Island © Duncan Limpus